

ES&H manual

Environment, Safety, and Health

Volume V

Part 51: Safety Analysis, Limits and Authorization

Document 51.4

Startup and Restart of Nuclear Facilities

Recommended for approval by the ES&H Working Group

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New document or new requirements

Approval date: October 23, 2001
Editorial Update: June 19, 2003

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This work performed under the auspices of the U.S. Department of Energy by University of California Lawrence Livermore National Laboratory under Contract W-7405-ENG-48.

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Startup and Restart of Nuclear Facilities

1.0 Introduction

1.1 Purpose and Scope

The purpose of this document is to establish the requirements and process for startup of new nuclear facilities and for the restart of existing nuclear facilities that have been shutdown. The requirements specify a readiness review process that shall, in all cases, demonstrate that it is safe to startup (or restart) the applicable facility. The facility shall be started up (or restarted) only after documented reviews of readiness (except for simple Readiness Assessments) have been conducted and the approvals specified in Department of Energy (DOE) Order 425.1B and this document have been received. The readiness reviews are not intended to be management tools to achieve readiness. Rather, the readiness reviews provide confirmation of readiness to start or restart operations.

1.2 Applicability

The requirements in this document apply to the startup of new Category 2 and 3 nuclear facilities, existing Category 2 and 3 nuclear facilities, or portions thereof following a nonroutine or extended shutdown at the direction of LLNL management or DOE/National Nuclear Security Administration (NNSA). It does not apply to accelerator or nonnuclear facilities.

1.3 General Guidance

Table 1 describes when an Operational Readiness Review (ORR) or Readiness Assessment (RA) is required (see Appendix A for definitions). An ORR or RA is not required for a routine shutdown (see Appendix B) under the following conditions unless directed by NNSA Livermore Site Office (NNSA/LSO) line management:

- The facility was performing program work within 90 days of shutdown and LLNL prestart procedures are in place (see Document 2.2, “Managing ES&H for LLNL Work,” in the *Environment, Safety, and Health (ES&H) Manual*.)
- Minor modifications that are made to the facility and/or procedures that do not affect the safety basis of the facility as determined through the Unreviewed Safety Question (USQ) Process (see Document 51.3, “Unreviewed Safety Question Process,” in the *ES&H Manual*).

Table 1. Startup/restart requirement summary.

Nuclear facility classification	Category 2		Category 3	
	Approval authority	Review type	Approval authority	Review type
New facility	Secretary of Energy ^a	ORR	DOE/NNSA cognizant secretarial officer (CSO) ^b	ORR
DOE/NNSA-management-directed, unplanned shutdown	CSO ^b	ORR	CSO ^b	ORR
Extended shutdown	≥12 months ^c CSO ^b	ORR	≥24 months NNSA/LSO operations office manager ^a	RA ^d (Type 2)
Facility modifications requiring modification to safety basis	CSO ^b	RA (or ORR) ^d (Type 2)	NNSA/LSO operations office manager ^a	RA ^d (Type 2)
LLNL-directed, unplanned shutdowns	DOE operations office manager ^b	RA ^d (Type 2)	LLNL	RA ^d LLNL Prestart Review ^{d,f} (Type 1)
DOE/NNSA-directed shutdown caused by operations outside safety basis	Approval authority ^e	ORR	Approval authority ^e	ORR
Other non-routine shutdowns (serious safety issues)	NNSA/LSO operations office manager ^a	RA ^d (Type 3)	NNSA/LSO operations office manager ^b	RA ^d (Type 3)
Routine shutdowns	LLNL	LLNL Prestart Review (Type 1)	LLNL	LLNL Prestart Review (Type 1)

^a Or designee by indicated DOE/NNSA official.

^b CSO may designate other approval authority based on specific circumstances.

^c See Section 4.0 of this document.

^d Note that for some facility modifications, it is practical to conduct an ORR. This determination can only be made by the approval authority.

^e Official designated to approve safety basis that was violated.

^f Requirements for LLNL Prestart Review is found in Document 2.2.

1.4 Exemptions

Exemption from the requirements in this document shall be processed in accordance with Document 2.3, "LLNL Exemption Process," in the *ES&H Manual*.

1.5 Application of the Graded Approach in ORR Planning

The graded approach (see Appendix A for definition) will be commensurate with items such as

1. The relative importance to safety.
2. The magnitude of hazard involved.
3. The life-cycle stage of a facility.
4. The programmatic mission of a facility.
5. The particular characteristics of a facility.
6. The cause and circumstances of the facility shutdown.
7. Other relevant factors.

All ORRs will address the minimum set of core requirements and any additional requirements as necessary for adequate review (breadth). A recent review, equivalent to an ORR, may be used as justification for eliminating a core requirement from the breadth of the ORR. A graded approach is used to determine the level of detail, that is, the depth of planning required for the ORR. The combination of breadth and depth forms the envelope (scope) within which the ORR is conducted.

Proper use of the graded approach is essential to conducting a successful ORR. The supporting principle governing the use of the graded approach shall be that knowledgeable personnel analyze the factors surrounding the startup or restart, determine the depth of the review needed, and then document the review. Precise documentation will facilitate communication with knowledgeable outside officials, assuring that the proper level of review has been conducted and that readiness to operate has been accurately verified. The depth of an ORR cannot be determined using a cookbook or formula approach. Depth requirements depend on knowledgeable people identifying the depth based on their experience, the facility's characteristics, the facility's operating environment, the operating and support organizations' capabilities, and the risks associated with the proposed startup or restart.

Additional guidance on the application of the graded approach can be found in DOE-STD-3006, Appendix 1.

2.0 Startup Notification Report

The Startup Notification Report (SNR) is a report that identifies all planned startups/restarts of facilities for the next year that have not yet occurred. The SNR shall be prepared using the format of Appendix C and provide justification for any review type

or approval authorization not meeting the requirements. The SNR is to be updated and submitted to NNSA/LSO quarterly.

LLNL shall also notify DOE/NNSA through the SNR when an unplanned shutdown requires an ORR or RA (Type 2 or 3) for restart. This notification shall be made in writing promptly after the decision is made and include all the information required.

The appropriate approval authority (see Table 1) will review and approve this report. Approval of the SNR is required before a formal Plan of Action can be prepared and an ORR or RA is conducted (see Figs. 1 and 2 and Section 3.4.1).

3.0 Operational Readiness Review

An ORR is a disciplined, systematic, documented, and performance-based examination of facilities, equipment, personnel, procedures, and management control systems to ensure that a facility or activity will be operated within its approved safety basis. The ORR process provides a formalized, structured, and independent verification by LLNL and DOE/NNSA of readiness to startup a facility. The LLNL ORR is conducted by a multidisciplinary team lead by a team leader. LLNL shall have the facility ready for operation prior to declaring readiness. The ORR process shall not be used as a management technique to achieve the state of readiness.

3.1 ORR Process

The process shown in Fig. 1 lays out the sequence of steps that LLNL is required to take when completing the ORR. Deliverables of the LLNL ORR process are described in Section 3.4. Additional information concerning the DOE/NNSA review and approval of LLNL ORRs can be found in NNSA/LSO Standard Operating Procedure “AMLS/AMEN Startup and Restart of Facilities.”

3.2 ORR Team Leader

The ORR team leader is a senior individual, appointed by the facility associate director (AD), with the necessary qualifications for managing and conducting the ORR. The basis of the qualifications should include:

- Technical familiarity with the activities and functional areas being reviewed.
- Previous performance-based review experience or training.
- Demonstrated leadership and managerial skills.
- ORR experience or formal training.

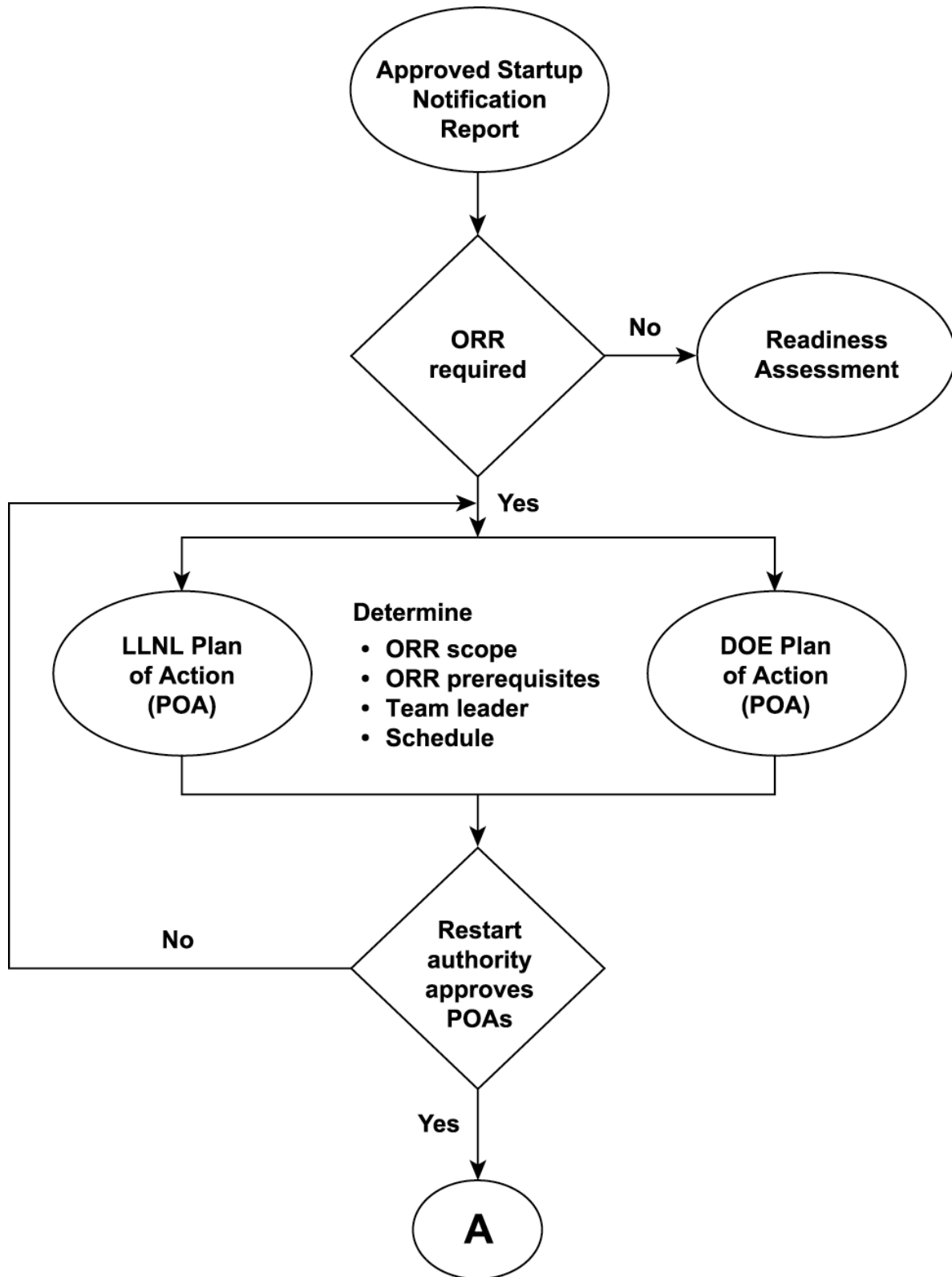


Figure 1. Steps for conducting an Operational Readiness Review.

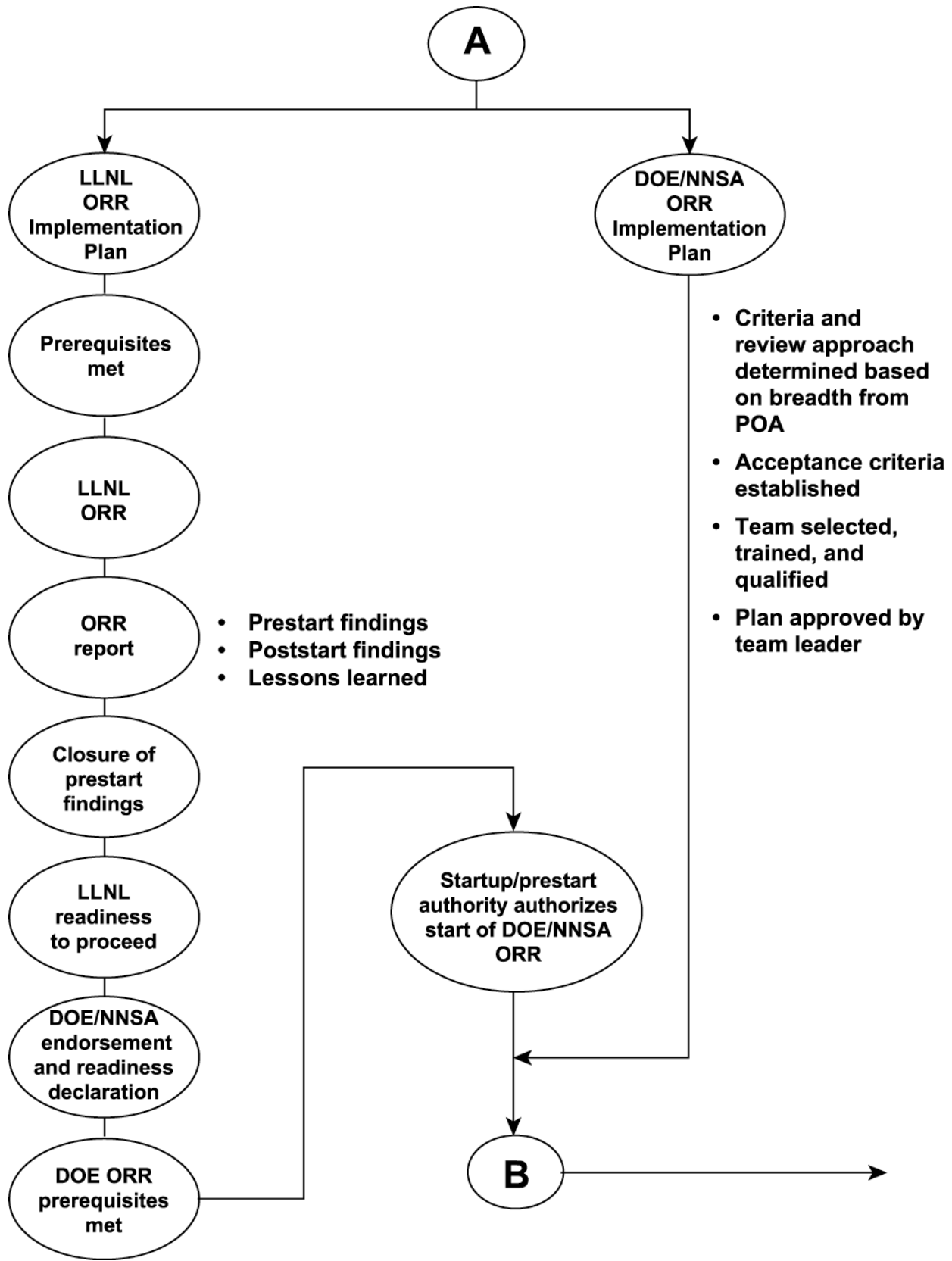


Figure 1. Steps for conducting an Operational Readiness Review (cont'd).

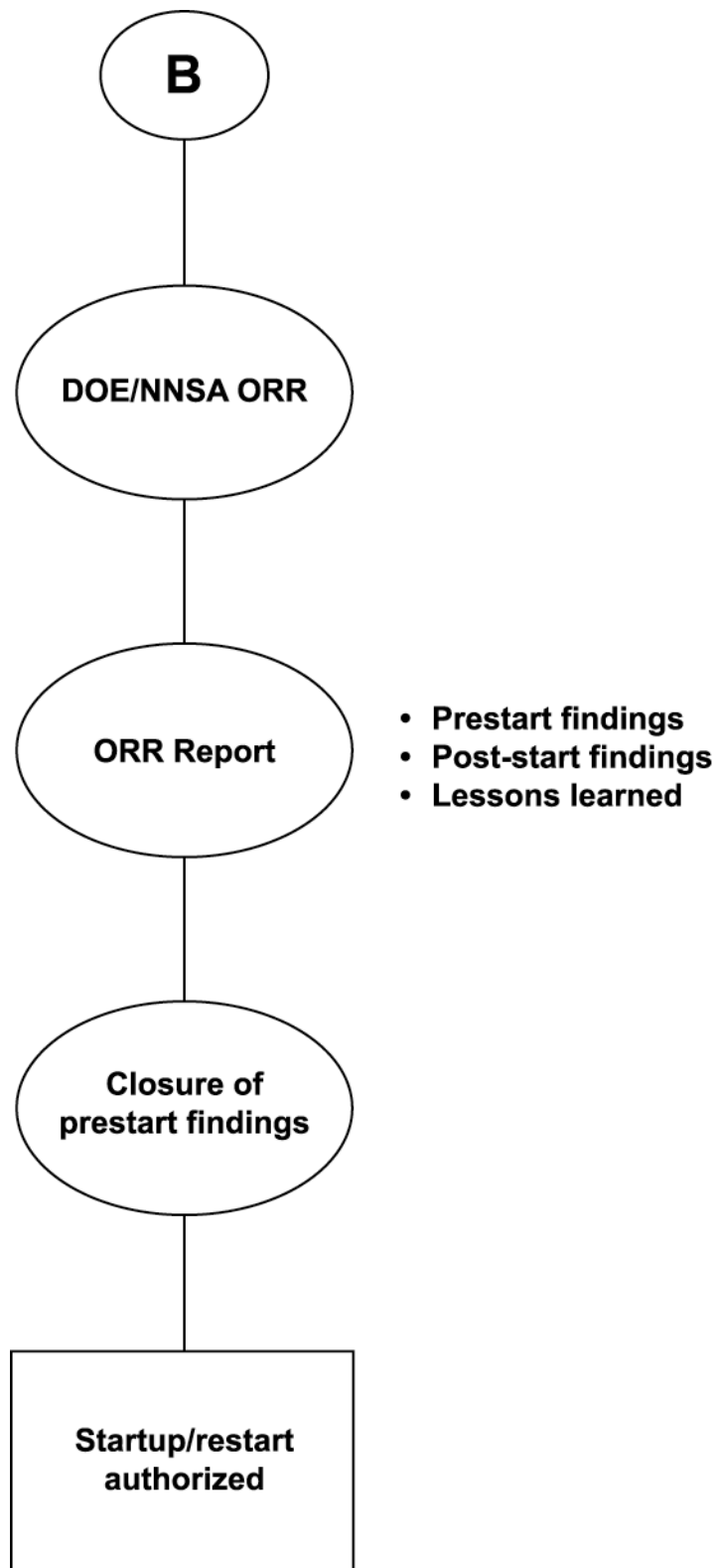


Figure 1. Steps for conducting an Operational Readiness Review (cont'd).

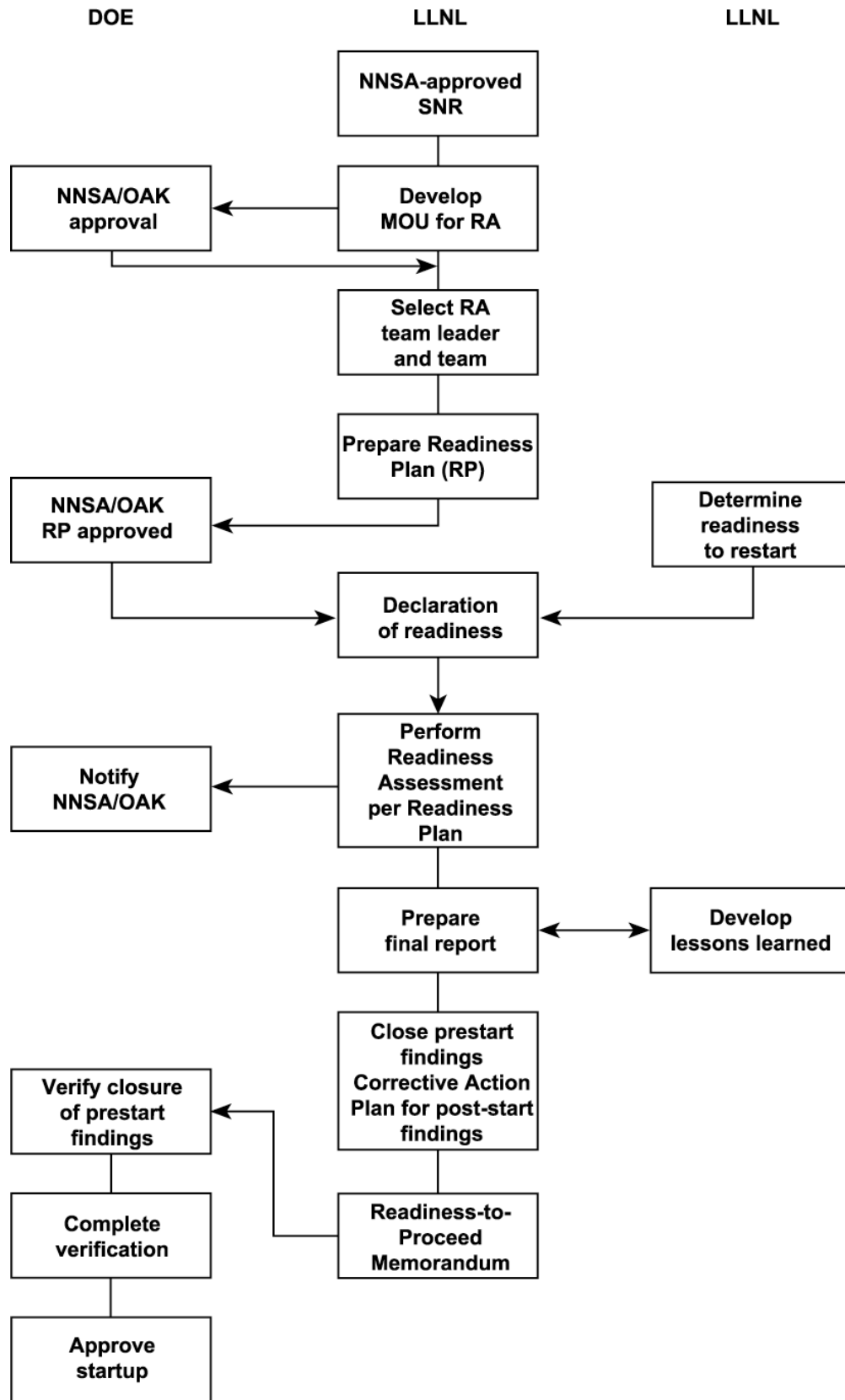


Figure 2. Readiness Assessment Process (Type 2).

3.3 ORR Readiness Review Team

The ORR team has overall responsibility for examining the aspects of the activity under review and for assuring the team, management, and DOE/NNSA that the equipment, procedures, and personnel associated with the activity are ready for startup and safe operation. To ensure that the ORR team is independent, it shall not include as senior members individuals (including the team leader) who have direct management responsibility for the work being reviewed by the startup or restart authority. Any exceptions require approval of the startup or restart authority. Additionally, no ORR team member shall review his or her own work or work for which they are directly responsible.

Each team member should have the following qualifications, as defined and verified by the team leader:

- Technical knowledge of the area assigned for evaluation. The knowledge should include experience working in the technical area.
- Knowledge of performance-based assessment processes and methods. This knowledge may be gained through experience as an auditor or inspector or it may be gained through training and evaluated as acceptable by the team leader.
- Facility-specific information which may be gained through a combination of required reading and facility tours and presentations.

3.4 LLNL ORR Process Deliverables

The ORR process deliverables are the plan of action, implementation plan, final report, and Readiness-to-Proceed Memorandum.

3.4.1 Plan of Action

LLNL shall prepare a plan of action (POA) that describes the breadth of the ORR and the prerequisites that shall be met to start the ORR. It is the document by which management defines what will be evaluated during the ORR. Both LLNL and DOE/NNSA will prepare POAs that are submitted to the restart authority for approval. A minimum set of core requirements, as defined in Appendix D, shall be addressed in the POA. Justification shall be provided in the plan of action, if it is determined that a particular core requirement is not to be reviewed.

The POA may reference a timely, independent review that addressed the requirements in a technically sound manner to justify not performing further evaluation of a core requirement during an ORR. The purpose of these core requirements is to assess the readiness of facility personnel, programs, and equipment to conduct work safely; hence, these core requirements are directly related to the seven guiding principles of

Integrated Safety Management (ISM). The core requirements apply to both DOE/NNSA and the contractor as appropriate, unless otherwise noted.

The POA shall be approved by the Facility AD and provided to NNSA/LSO for transmittal to DOE-HQ (EH-2) for review and comment.

3.4.2 Implementation Plan

The Implementation Plan (IP), prepared by the team leader, shall specify the scope of the ORR, including the breadth and depth. It should guide the evaluations to be conducted during the ORR. Evaluations may include observing and documenting the responses of operating and support services personnel to normal and off-normal events as demonstrated by drills, preoperational tests, and exercises. In addition, field assessments should be conducted to verify that field configurations match the applicable supporting documentation. The ORR team should also conduct interviews with personnel, including management, to evaluate their readiness to conduct operations. The ORR evaluations should place particular emphasis on structures, systems, and components that are safety related (relevant to public and worker safety and health) or are of particular importance to the safety of the planned operation of the activity.

3.4.3 Final Report

When the LLNL ORR is complete, the ORR team leader prepares and approves a final report. The final report shall document the results of the ORR and state whether startup or restart of the nuclear facility can proceed safely. The final report shall also state whether the facility management has established the following:

- An agreed upon set of requirements to govern safe operations of the facility.
- The formalization of this set of requirements through the contract or other enforceable mechanism (e.g., authorization basis or Work Smart Standards).
- The appropriate implementation of these requirements in the facility.
- Appropriate compensatory measures, formally approved, in place during the period prior to full implementation.
- Adequate protection of the public health and safety, workers, and the environment.

The conclusion shall be based on

- Review of the program to document conformance with the agreed upon set of requirements, including a process to address new requirements.
- Use of references to the established requirements in the ORR documentation.

Additionally, the final report shall include a lessons learned section that may relate to design, construction, operation, decommissioning of similar facilities, and future Readiness Review efforts.

The core requirements, in aggregate, address many of the core functions and guiding principles of an ISM System (ISMS). The final report should include a statement regarding the team leader's assessment of the adequacy of the implementation of those functions and principles.

3.4.4 Readiness-to-Proceed Memorandum

The Readiness-to-Proceed Memorandum is the formal communication from LLNL to DOE/NNSA that the facility has been brought to a state of readiness to start operations. The memorandum is a prerequisite to the DOE ORR. NNSA/LSO will use the contents of the Readiness-to-Proceed Memorandum, coupled with its own understanding of the status of the facility, as a basis for the recommendation or decision to commence the DOE/NNSA ORR.

The Readiness-to-Proceed Memorandum should not be submitted until all actions required for startup or restart have been completed; however, a manageable list of open prestart items that have a well-defined plan and schedule for closure is allowed (refer to DOE-STD-3006 for additional guidance).

4.0 Readiness Assessment

The RA, like the ORR, is a disciplined, systematic, documented, and performance-based examination of facilities, equipment, personnel, procedures, and management control systems performed to ensure that a facility will be operated safely within its approved safety basis. However, the RA process is intended to be less rigorous than an ORR and is conducted when an ORR is not required (see Table 1). The amount of detail in each RA will vary depending on the complexity and hazards of the facility and the situation surrounding the startup. It may be as short and simple as a restart check procedure, or it may approach the breadth and depth of an ORR. The level of detail shall be adequate to justify the decision being proposed and for preparers, reviewers, and the approver to defend the decisions made. LLNL shall have the facility ready for operation prior to declaring readiness. The RA shall not be used as a management technique to achieve the state of readiness.

The LLNL SNR recommends to NNSA/LSO the correct level of RA necessary using a graded approach. The readiness of a facility is based on the following:

- An approved safety basis as defined in approved safety documentation.

- Approved environmental documentation.
- A safe working environment.
- Compliance with Work Smart Standards (WSS).

The RA shall verify that any necessary requirements documentation is approved and in place and that procedures, personnel, equipment, and systems support the approved requirements.

Where NNSA/LSO is the approval authority, LLNL shall use the following to facilitate the RA:

- A Memorandum of Understanding (MOU) between the LLNL and NNSA/LSO approval authority on the conduct of the RA.
- A Readiness Plan (RP) developed by the team leader and approved by the facility management and NNSA/LSO. The RP sets the requirements for the RA evaluations and incorporates the requirements of the MOU.

The MOU shall include the level of participation by LLNL and NNSA/LSO during the RA. The MOU is approved by the NNSA/LSO approval authority and is further described in Appendix E.

Facility/program management should use their understanding of the requirements in the RA process when making the final declaration of the operational readiness for the start or restart (i.e., prior to the start of the RA) of a nuclear facility, or portions thereof, whether or not an LLNL RA/ORR or DOE/NNSA RA/ORR is required.

The team leader shall meet the same qualification and independence requirements as described in Section 3, except for simple (Type 1) RAs, which can be performed by the facility manager. The three levels for the RA process are described in the following sections.

4.1 LLNL RA with LLNL as the Approval Authority (Type 1—LLNL Prestart Review)

This type of readiness assessment, also known as a LLNL Prestart Review, is described in Document 2.2, which details the conduct and documentation required. Normally, the LLNL Prestart Review process is used for the restart following routine shutdowns of Category 2 and 3 facilities, as outlined in Appendix B, unless there are serious safety concerns. This type of prestart review is also appropriate for the startup of new programmatic work within existing systems, which is described in the facility safety basis, such as a single workstation. A list of the non-routine (see Appendix B) planned

Type 1 startups shall be submitted to NNSA/LSO at the same frequency (see Section 2.0) but separate from the Startup Notification Report.

4.2 LLNL RA with -NNSA/LSO as the Approval Authority (Type 2)

The restart of Category 2 and 3 facilities, or portions thereof, after LLNL-directed shutdowns normally will follow an LLNL RA with NNSA/LSO as the approval authority in the following cases:

- LLNL-directed unplanned shutdowns of Category 2 facilities (unless there are serious safety concerns).
- Shutdowns of Category 3 facilities for serious safety reasons.
- Extended shutdowns of Category 3 facilities.
- New or modified safety systems involving the safety basis of Category 2 and 3 facilities.
- Activation of new or modified programmatic work involving the safety basis of Category 2 and 3 facilities.

The facility manager shall develop an MOU, in accordance with Appendix E, at least two months prior to the planned startup or promptly for unplanned restarts. This MOU shall be approved by the facility associate director with concurrence by the deputy director for operations. The MOU shall then be submitted to NNSA/LSO for final approval before the RA is started. The RA process is outlined in Fig. 2.

DOE's review and approval process for LLNL's RA can be found in NNSA/LSO Standard Operating Procedure "AMLS/AMEN Startup and Restart of Facilities."

4.3 LLNL RA followed by an NNSA/LSO RA with NNSA/LSO as the Approval Authority (Type 3)

For all other RAs, the Laboratory will prepare the RA, DOE/NNSA will prepare another RA, and DOE/NNSA will approve it. These RAs may be performed in parallel if so specified in the MOU; however, justification for this action shall be documented in the MOU.

The LLNL RA shall follow the same process as described in Section 4.2 with the following exceptions:

- After LLNL has closed any LLNL-identified prestart findings and issued the Readiness-to-Proceed Memorandum, NNSA/LSO will initiate its own Readiness Assessment.

- LLNL will close any DOE/NNSA-identified prestart findings, and DOE/NNSA will verify the closure.
- When the approval authority is satisfied with the NNSA/LSO final report, he/she will authorize startup of the facility.

4.4 RA Process Deliverables

The RA process deliverables are the MOU, RP, final report, and Readiness-to-Proceed Memorandum.

4.4.1 Memorandum of Understanding

The MOU is the agreement for the basic review process proposed by LLNL for the Readiness Assessment when NNSA/LSO is designated as the approval authority. Refer to Appendix E for details of the MOU.

4.4.2 Readiness Plan

A RP serves the same purpose as the Implementation Plan in the ORR process and is used when DOE/NNSA is designated as the approval authority for the RA.

4.4.3 Final Report

Upon completion of the LLNL Readiness Assessment, the RA team leader prepares and approves a final report. The final report shall document the results of the RA and present a conclusion as to whether restart of the nuclear facility can proceed safely.

There shall be a lessons learned section of the final report that may relate to design, construction, operation, decommissioning of similar facilities, and future Readiness Review efforts.

4.4.4 Readiness-to-Proceed Memorandum

A Readiness-to-Proceed Memorandum, described in Section 3.4.4 and tailored to the RA, is required for

- LLNL RAs where NNSA/LSO is the approval authority (Type 2).
- LLNL RAs, followed by a NNSA/LSO RA, where NNSA/LSO is the approval authority (Type 3).

5.0 Responsibilities

All workers and organizations shall refer to Document 2.1, "Laboratory and ES&H Policies, General Worker Responsibilities, and Integrated Safety Management," in the *ES&H Manual* for a list of general responsibilities. This section describes specific responsibilities of LLNL organizations and workers who have key safety roles.

5.1 Deputy Director for Strategic Operations

- Prepares, concurs with, and submits to DOE/NNSA LLNL's SNRs and Type 1 startup notifications for nuclear facilities, based on input from facility associate directors.
- Assures institutional oversight of the ORR/RA process as necessary.

5.2 Facility AD

- Provides required input to the DDO for the LLNL SNRs and Type 1 startup notifications.
- Ensures the facility is ready for startup or restart before the ORR/RA is initiated and declares readiness.
- Ensures action is taken on findings in the ORR and RA deliverables as detailed in Sections 3.4 and 4.4 of this document.
- Functions as the approval authority for Readiness Assessments where LLNL has the approval authority.
- Approves the Plan of Action for ORRs.
- Approves the MOU for LLNL Ras prior to submission to NNSA/LSO.
- Appoints the team leader and team members for ORRs and Ras performed by LLNL.
- Approves the Readiness-to-Proceed Memorandum following the conduct of the ORR/RA.

5.3 Program AD

- Ensures programmatic work in facilities being started or restarted meet the requirements of the ORR/RA deliverables.
- Ensures pre- and post-startup findings related to programmatic work are corrected.
- Provides input to the facility AD on new or modified programs that may involve a facility RA.

5.4 Facility Manager/Facility Point of Contact

- Conducts prestart reviews in accordance with LLNL requirements as a prerequisite to initiating a formal ORR or RA.
- Prepares the MOU for Ras.
- Participates in ORRs and Ras for facilities being started up.
- Ensures pre- and post-startup findings developed as part of the ORR/RA process are corrected.
- Provides input to the facility AD for restarts from planned and unplanned shutdowns.
- Conducts the Prestart Review (RA, Type 1) in accordance with Document 2.2.

5.5 Operational Readiness Review/Readiness Assessment Team Leader

- Oversees the ORR/RA process and is responsible for
 - Defining ORR/RA team membership.
 - Approving the ORR Implementation Plan and final reports for the ORR/RA.
 - Planning, coordinating, and conducting the ORR/RA.
 - Estimating the level of effort and schedule requirements.
 - Establishing ORR/RA objectives and milestones.
 - Reviewing necessary background information (e.g., description of process equipment and control measures).
 - Acting as the team interface with management.
- Ensure ORR/RA deliverables (except the MOU) are developed in accordance with Sections 3.4 or 4.4

6.0 Work Standards

DOE Order 425.1C, "Startup and Restart of Nuclear Facilities."

7.0 Resources for More Information

DOE-STD-3006, "Planning and Conduct of Operational Readiness Reviews (ORR)."

DOE-OAK Standard Operating Procedure, "AMLS/AMEN Startup and Restart of Facilities," November 29, 1999.

Appendix A

Terms and Definitions

Approval authority	The only individual with the authority to make decisions regarding acceptance of safety risk and authorization-basis-type documentation for a facility as defined by applicable Department of Energy (DOE) orders. Further delegations shall be formal and in accordance with all conditions and requirements accompanying any delegation of approval authority. The approval authority may be a DOE/NNSA or LLNL individual, depending on the type of facility and its hazard classification/categorization.
Cognizant secretarial officer (CSO)	The senior manager within a DOE/NNSA organization such as Defense Programs (DP) or Office of Nuclear Energy (NE), who may be an assistant secretary of energy or an office director. A secretarial office normally will be designated with a “-1” (e.g., DP-1, NE-1).
Extended shutdown	A shutdown that exceeds a time limit based on the categorization of the facility as described in DOE-STD-1027-92. The time limits are as follows: <ul style="list-style-type: none"> • Category 2 nuclear facility: shutdown 12 months or more. • Category 3 nuclear facility: shutdown 24 months or more.
Graded approach	For the purpose of this document, a graded approach is the process by which the level of analysis, documentation, and actions necessary to comply with a requirement are commensurate with <ol style="list-style-type: none"> 1. The relative importance to safety, safeguards, and security. 2. The magnitude of any hazard involved. 3. The life cycle stage of a facility. 4. The programmatic mission of a facility. 5. The particular characteristics of a facility. 6. Any other relevant factor.

National Nuclear
Security
Administration
(NNSA)

A semiautonomous agency of the U.S. Government within the Department of Energy.

Nonreactor nuclear
facility

A facility in which activities or operations involve radioactive and/or fissionable materials in such form and quantity that a nuclear hazard potentially exists to employees or the general public. Material quantity thresholds are established in DOE-STD-1027-92, Change 1, for nuclear facility classification. These facilities are then categorized as Category 1, 2, or 3.

Included are activities or operations that:

1. Produce, process, or store radioactive liquid or solid waste, fissionable materials, or tritium.
2. Conduct separations operations.
3. Conduct irradiated materials inspection, fuel fabrication, decontamination, or recovery operations.
4. Conduct fuel enrichment operations
5. Perform environmental remediation or waste management activities involving radioactive materials.

Incidental use and generation of radioactive materials in a facility operation (e.g., check and calibration sources, use of radioactive sources in research and experimental and analytical laboratory activities, electron microscopes and x-ray machines) does not ordinarily mean that the facility is required to be included in this definition.

Operational Readiness
Review (ORR)

A disciplined, systematic, documented, performance-based examination of facilities, equipment, personnel, procedures, and management systems to ensure that a facility will be operated safely within its approved safety envelope as defined by the facility safety basis. The ORR scope is defined based on the specifics of the facility and/or the reason for the shutdown as related to a minimum set of core requirements. A graded approach will be used in defining the depth of the ORR core requirements.

Plan of Action (POA)	A high-level document describing the breadth and prerequisites of the Operational Readiness Review, the composition of the team, the review, and the designated startup or restart authority.
Post-start Finding	A finding that needs to be corrected but may be corrected after the start of the activity. Post-start findings are addressed by a corrective action plan that includes any compensatory measures taken.
Prestart Finding	A finding that needs to be corrected before an activity can be started.
Readiness Assessment (RA)	A review that is conducted to determine a facility's readiness to startup or restart when an Operational Readiness Review is not required. A RA is intended to be less rigorous than an ORR.
Routine shutdown	A planned or unplanned stoppage of work in a facility by LLNL management. This may be due to conditions such as the end of the work period, lack of programmatic work, routine maintenance, inspections to determine facility status after alarms, or conditions determined not to impact facility safety and that are in compliance with applicable Technical Safety Requirements (TSRs)/Operational Safety Requirements (OSRs). See Appendix B for examples of routine shutdowns.
Safety Basis	Combined information relating to the control of hazards at a nuclear facility (including design, engineering analyses, and administrative controls) upon which DOE/NNSA depends for its conclusion that activities at the facility can be conducted safely.
Shutdown	For the purpose of this document, a shutdown is the condition in which a nonreactor nuclear facility, or a portion thereof, ceases programmatic work and is placed in a safe condition.

Appendix B

Examples of Routine Shutdown

Type of shutdown	Description	Required prestart activity (shall be documented)	Person authorized to restart
1. Planned	Routine preventive maintenance or surveillance of nuclear safety systems in accordance with facility TSR/OSR (e.g., the monthly surveillance testing of its emergency generators or calibration of its alarm systems).	Review post-maintenance or surveillance results.	Facility manager
2. Planned	Shutdown for a thorough inspection or audit of nuclear safety systems that results in no substantial modifications.	Review post-inspection results.	Facility manager
3. Planned	Shutdown to allow for a minor modification to nuclear safety system(s).	Perform management prestart review.	Facility manager
4. Planned	Shutdown for routine preventive maintenance and decontamination of experimental equipment.	Verify negligible impact on safety system or facility operations.	Authorizing Individual
5. Planned	The facility/program exceeds the pre-established duty cycle standby time limit. (Default is two weeks unless otherwise established and approved by the appropriate associate director).	Verify negligible impact on safety system or facility operations.	Facility manager and/or Authorizing Individual
6. Planned	Shutdown to perform calibrations associated with or affecting nuclear safety.	Verify negligible impact on safety system or facility operations.	Facility manager and/or Authorizing Individual
7. Planned	Shutdown to allow for experimental system/equipment set up or dismantling activities, which occur between experiments, or runs having only minor impact on nuclear safety.	Verify negligible impact on safety system or facility operations.	Authorizing Individual
8. Unplanned	Shutdown due to severe weather, such as wind, lightning, tornado, or hail, without damage to the facility or its safety systems. Note: Requires DOE/NNSA notification of restart within one day via daily operations status report.	Verify negligible impact on safety system or facility operations.	Facility manager

Type of shutdown	Description	Required prestart activity (shall be documented)	Person authorized to restart
9. Unplanned	Shutdown after a seismic event where there is no degradation to the nuclear safety systems or to the ability to function within the normal safety envelope. Note: Requires DOE/NNSA notification of restart within one day via daily operations status report.	Inspect facility and verify safety systems operate as intended.	Facility manager
10. Unplanned	Shutdown due to false alarms (e.g., continuous air monitors or stack alarms), which may involve evacuations.	Determine cause of false alarm and correct it. Verify safety systems operating as intended.	Facility manager
11. Unplanned	Interruption of outside utility service (e.g., power, water, or communications) where all safety and backup systems operate normally.	Inspect facility and verify safety systems operate as intended.	Facility manager
12. Unplanned	Shutdown due to a supervisory alarm, ground fault, or only one detector of a criticality alarm.	Determine cause of false alarm and correct it. Verify safety systems operating as intended.	Facility manager
13. Unplanned	Shutdown due to a false security alarm.	Obtain release from Safeguards and Security for resuming operations and, as appropriate, DOE/NNSA Safeguards and Security.	Facility manager
14. Unplanned	Shutdown due to minor degradation of high-efficiency particulate air (HEPA) filters, but degradation is within limits of the TSR.	Change filters and verify proper functioning of new filters.	Facility manager
15. Unplanned	Shutdown due to minor fluctuations in control circuits causing backup components to operate on-line or dampers to function.	Restore to lead system operation.	Facility manager
16. Unplanned	Shutdown due to minor corrective maintenance activities (e.g., changing loose belts, replacement of noisy bearings, cleaning alarm contact, loose wire connections, or breakers).	Restore to normal operations.	Facility manager
17. Unplanned	Shutdown due to shorts or failures of electrical systems/paging systems.	Restore to normal operations.	Facility manager

Type of shutdown	Description	Required prestart activity (shall be documented)	Person authorized to restart
18. Unplanned	Shutdown for emergency inventory by Safeguards and Security to address material control and accountability issues.	Obtain release from Materials Management section leader and, as appropriate, DOE/NNSA Safeguards and Security.	Facility manager

Appendix C

Startup Notification Report Format

STARTUP NOTIFICATION REPORT ONE-YEAR PROJECTION									DATE:
Facility & Activity Name	Hazard Category	LLNL Review	DOE/NN SA Review	Review Type	Approval Authority	Startup or Restart	Scheduled Start	Reasons for Restart	Point of Contact

Facility & Activity Name	This description should be detailed enough for a person to have a basic understanding of the facility and the activities to be reviewed.
Hazard Category	The facility hazard category from the LLNL hazards category list. If the hazards have not been categorized or classified yet, a description of the relative hazards shall be referenced and attached to the report.
LLNL Review	Scheduled start and completion of the LLNL ORR/RA startup or restart activities.
DOE/NNSA Review	Scheduled start and completion of the DOE/NNSA ORR/RA startup or restart activities.
Review Type	The type of review required by Table 1. If the review type differs from Table 1, justification shall be provided with the report.
Approval Authority	The final approval authority for the activity based on Table 1. If the approval authority differs from Table 1, justification shall be provided with the report.
Startup or Restart	Designation of review for a startup of a new facility/activity or restart of an existing facility/activity.
Scheduled Start	Month and year in which the activity is scheduled to actually startup or restart.
Reason for Restart	If the activity is a restart, the reason for the shutdown shall be provided. This may be a very short description. If a more detailed discussion is required, it shall be attached to the report.
Point of Contact	LLNL point of contact.

Appendix D

Minimum Core Requirements for ORRs

Guiding Principle #1. Line management is responsible for the protection of employees, the public, and the environment. Line management includes those contractor and subcontractor employees managing or supervising employees performing work.

- 1) Line management has established programs to ensure safe accomplishment of work. (The authorization authority should identify in the plan of action those specific infrastructure programs of interest for the startup or restart.) Personnel exhibit an awareness of public and worker safety, health, and environmental protection requirements and, through their actions, demonstrate a high-priority commitment to comply with these requirements.

Guiding Principle #2. Clear and unambiguous lines of authority and responsibility for ensuring ES&H are established and maintained at all organizational levels.

- 2) Functions, assignments, responsibilities, and reporting relationships (including those between the line operating organization and ES&H support organizations) are clearly defined, understood, and effectively implemented with line management responsibility for control of safety.

Guiding Principle #3. Personnel possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities.

- 3) The selection, training, and qualification programs for operations and operations support personnel have been established, documented, and implemented. The selection process and applicable position-specific training for managers ensure competence commensurate with responsibilities. (The training and qualification program encompasses the range of duties and activities required to be performed.)
- 4) Level of knowledge of managers, operations, and operations support personnel is adequate based on reviews of examinations and examination results and selected interviews of managers, operating, and operations support personnel.
- 5) Modifications to the facility have been reviewed for potential impacts on training and qualification. Training has been performed to incorporate all aspects of these changes.

Guiding Principle #4. Resources are effectively allocated to address ES&H, programmatic, and operational considerations. Protecting employees, the public, and the environment is a priority whenever activities are planned and performed.

- 6) Sufficient numbers of qualified personnel are available to conduct and support operations. Adequate facilities and equipment are available to ensure operational support services are adequate for operations. (Such support services include operations, training, maintenance, waste management, environmental protection, industrial safety and hygiene, radiological protection and health physics, emergency preparedness, fire protection, quality assurance, criticality safety, and engineering).

Guiding Principle #5. Before work is performed, the associated hazards are evaluated, and there is established an agreed-upon set of standards and requirements that, if properly implemented, provides adequate assurance that employees, the public, and the environment are protected from adverse consequences.

- 7) Facility safety documentation that describes the “safety envelope” of the facility is in place and has been implemented. The safety documentation should characterize the hazards and risks associated with the facility and should identify preventive and mitigating measures (e.g., systems, procedures, and administrative controls) that protect workers and the public from those hazards and risks. Safety structures, systems, and components (SSCs) are defined, and a system to maintain control over their design and modification is established.
- 8) A program is in place to confirm and periodically reconfirm the condition and operability of safety SSCs. This includes examinations of records of tests and calibration of these systems. The material condition of all safety, process, and utility systems supports the safe conduct of work.
- 9) The facility systems and procedures, as affected by facility modifications, are consistent with the description of the facility, procedures, and accident analysis included in the safety basis.

Guiding Principle #6. Administrative and engineering controls to prevent and mitigate hazards are tailored to the work being performed and associated hazards. Emphasis should be on designing the work and controls to reduce or eliminate the hazards and to prevent accidents and unplanned releases and exposures.

- 10) Adequate and correct procedures and safety limits are in place for operating the process systems and utility systems that include revisions for modifications that have been made to the facility.
- 11) A routine drill program and emergency operations drill program, including program records, have been established and implemented.
- 12) An adequate startup or restart program has been developed and includes plans for graded operations and testing after startup or resumption to simultaneously confirm operability of equipment, the viability of procedures, and the performance and knowledge of the operators. The plans should indicate validation processes for

equipment, procedures, and operators after startup or resumption of operations, including any required restrictions and additional oversight.

- 13) The formality and discipline of operations are adequate to conduct work safely, and programs (e.g., DOE 5480.19) are in place to maintain this formality and discipline.

Guiding Principle #7. The conditions and requirements to be satisfied for operations to be initiated and conducted are established and agreed-upon by DOE/NNSA and the contractor. These agreed-upon conditions and requirements are requirements of the contract and binding upon the contractor. The extent of documentation and level of authority for agreement shall be tailored to the complexity and hazards associated with the work and shall be established in a Safety Management System.

- 14) Formal agreements between the operating contractor and DOE/NNSA have been established via the contract or other enforceable mechanism to govern the safe operations of the facility. A systematic review of the facility's conformance to these requirements has been performed. These requirements have been implemented in the facility, or compensatory measures are in place and formally agreed to during the period of implementation. The compensatory measures and the implementation period are approved by DOE/NNSA.
- 15) A feedback and improvement process (e.g., DOE P 450.5) has been established to identify, evaluate, and resolve deficiencies and recommendations made by oversight groups, official review teams, audit organizations, and the operating contractor.

Additional DOE/NNSA Oversight Requirements include the following.

- 16) The technical and managerial qualifications of those personnel at the DOE/NNSA field organization and at DOE/NNSA Headquarters who have been assigned responsibilities for providing direction and guidance to the contractor, including the Facility Representatives, are adequate (applies to DOE/NNSA Readiness Review only).
- 17) The breadth, depth, and results of the responsible contractor Readiness Review are adequate to verify the readiness of hardware, personnel, and management programs for operations (applies to DOE/NNSA Operational Readiness Review only).
- 18) NNSA/LSO operations office oversight programs, such as occurrence reporting, Facility Representative, corrective action, and quality assurance programs, are adequate (applies DOE/NNSA Readiness Review only).

Appendix E

Format and Minimum Content for a Readiness Assessment Memorandum of Understanding

Facility management develops a Memorandum of Understanding (MOU) to communicate the basic review process proposed by LLNL for the RA. The following contains the minimum information required for a MOU.

1. **Name of the facility.** This description should be detailed enough for a person with no previous knowledge of the facility to have a basic understanding of the facility and the activities to be reviewed. Include in this description the boundaries of the review; the physical structure, systems, and components; and programmatic personnel.
2. **New start or restart.** If the MOU is for a restart, it should describe the length of time the facility has been shutdown and the reason for shutdown, including the circumstances that caused the shutdown. Note that the shutdown time begins with the last time the facility had performed *programmatic work*. System testing, acceptance testing, or operational testing does not constitute operations of the facility.
3. **Hazard category for the facility/activity.** The category for the facility and the basis for the designation, including reference to the authorization basis document, should be documented. In the event that no formal hazard categorization has been made, a discussion of the relative hazards involved is appropriate. A defensible technical justification approved by NNSA/LSO for the hazard categorization shall be referenced. This explanation shall include justification of segregation, if used.

The hazard level of the activity should be documented if this is the startup/restart of an activity within a facility.

4. **The means of conducting the RA.** This should identify the means LLNL will implement to conduct the RA. It shall state the graded approach used to provide the objective evidence for safety, based on the hazard of the facility. For simple reviews, standardized checklists may be applicable. Lines of inquiry may be applicable for more complicated RAs, and the criteria and review approach may be the correct method for the most complicated RAs. This section should be based on the hazards involved and the reason for performing the RA.
5. **Justification for the means of review.**

6. **Prerequisites for starting the review.** Defining the prerequisite conditions to be met by LLNL, facility, and/or program management prior to the start of the RA is an important element of a successful RA. Adequate detail should be included to permit an understanding of exactly which programs and personnel are considered essential to adequate oversight of the facility or process for start or restart. The prerequisites should be described in terms of specific measurable items.
7. **The level of involvement by LLNL, including independence of the review team.** For simple RAs, review by the facility manager or designee may be adequate. For a more complicated RA, a team with an independent team leader may be required, and the makeup of the team shall be described. Identify LLNL approval authority and the team leader.
8. **Facility/activity approval authority and justification, if differing from this procedure.**
9. **Anticipated start date.** Document the anticipated start date of the review and the anticipated start date of the facility/activity. The dates are for planning purposes only and should be the best estimate. Identification of a date does not imply that the start of the review will be schedule-driven rather than readiness-driven.